NEW BOOKS

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Scanning Electron Microscopy, Oliver C. Wells (McGraw-Hill Book Company; 1974, 421 pages, $22.95).

In its ten or so years of commercial availability, the scanning electron microscope (SEM) has become established and indispensable in every field of its applications. It is only in the last 3 years, however, that publications of books on the instrument and its applications have begun to fill a long overdue need. This book by Oliver Wells is the latest on the subject, and one which every practicing scanning electron microscopist should have available. It is replete with excellent tables, diagrams, and pertinent micrographs of good quality. Collaborating in varying degrees were Alan Boyde, Eric Lifshin, and Alex Rezanowich. All four are authorities in their respective interests, if only by virtue of their long and fruitful experience, part of which is incorporated in this book. This is one benefit of collaboration.

In addition to the normal table of contents and name and subject indices, the book has 12 chapters, a minor Appendix, and an extensive Bibliography (over 1200 citations) on SEM, a valuable compilation to which Wells has been attentive for some years. The first 8 chapters, pp. 1-207, cover the theoretical and instrumental aspects of SEM with a reasonably extensive use of mathematics. Those not interested in the math can extract its essence through a careful reading of the related text. The last 4 chapters, pp. 208-336, cover applications of the SEM in the physical sciences and technology, the generation and detection of X-rays, the 3-D aspects of imaging, and, finally, applications in biology and medicine. Each chapter and many sections have a short introductory sentence or paragraph indicating its intent or content, e.g., the first sentence of chapter 3 is "This chapter describes the penetration and back-scattering of electrons in an amorphous target and the generation of secondary electrons." This is a logically useful approach.

Chapter 1 summarizes the operation of the SEM, describes other electron microscopical instrumentation, and gives a brief historical development of scanning electron microscopy. Chapter 2 deals with signal to noise ratio (SNR) and details calculations of the beam current necessary for good image formation for various detector systems and contrast methods. Chapter 3 covers electron penetration, back-scattering, and secondary electron emission, and chapter 4 is concerned with electron-optical design of small-current probe-forming systems. The beam current in the SEM must exceed a minimum value for the noise level in the image to be acceptable. In Chapter 4, beam current calculations are derived as a function of accelerating voltage and limiting system parameters such as spherical and chromatic aberrations. Chapter 5 on Instrument Design is an informative and readable one with much pertinence to the average SEM user. Types of guns and vacuum systems are described with their practical limitations to resolution. Formation of contaminating layers and various collector systems are discussed as is the use of the energy filter to generate low-loss signals. Chapter 6 on contrast and resolution discusses methods for studying surface topography and different methods for displaying the image. Practical pointers are given for obtaining high resolution. Chapters 7 and 8 are of probably minuscule interest to the oil chemist. Chapter 7, electron channeling, covers image contrasts which arise from variation in the angle between the incident electron beam and the crystal lattice of the specimen, while Chapter 8, voltage and magnetic contrasts, is concerned with image contrasts which arise because the secondary electrons are deflected as they leave the specimen. Methods of obtaining and optimizing these and their use in the semiconductor field are fully described. Chapter 9 includes applications of the SEM to the physical sciences and technology. The first section by Rezanowich summarizes 10 years of scanning electron microscopy at the Pulp and Paper Research Institute of Canada. Some general techniques of sample preparation are given. Limited other applications in materials science and the electron beam fabrication of small structures follow. Chapter 10 by Lifshin discusses principles of X-ray formation and detection by crystal spectrometers and solid state detectors together with limitations, advantages, and disadvantages of each system. In Chapter 11, Boyde is concerned with the 3-dimensional aspects of SEM images and describes the preparation and observation of stereo pairs, as well as the making of measurements from them. The associated problems and precautions are carefully and very well covered. Finally, Chapter 12, also contributed by Boyde, remarks mainly on the preparation of histological and cytological material. Of necessity an overview, the chapter contains procedural information and critical comments which make it invaluable in even general application. Those on critical point and freeze drying are particularly apt.

The extensive Bibliography which completes the book represents the latest version of a compilation that includes every major, and most of the minor contributions to the literature of scanning electron microscopy.

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Applications of High-Speed Liquid Chromatography, by J.N. Done, J.H. Knox, and L. Loheac. (John Wiley & Sons, Inc., New York, NY, 1975, 238 pages, $19.75).

The physical format of this book consists of 2 parts. The first part involves the development of liquid chromatography in terms of methodology and equipment. A brief discussion of chromatographic theory also is presented. Part one is the smallest of the two and comprises ca. 40 pages. The second and largest part consists of 198 pages of selected applications of liquid chromatography to specific problems in various categories such as foods, hydrocarbons, and pharmaceuticals. The material is presented in the form of actual chromatograms (ca. 150) taken from the literature. The chromatograms are of a standard format stating the operating conditions and other pertinent data for the given separation.

The table of contents also consists of 2 parts conforming to those cited in the format. Part one relates to technique, equipment, and theory. Part two outlines and presents chromatograms according to kind or classes of compounds separated such as organic acids, insecticides, and natural products. Several chromatograms of each type of separation are presented.

The uniqueness of the book is that many examples and applications of high speed liquid chromatographic separations are presented in an organized manner. Actual and potential applications can well be realized by these

examples. Because the material is presented in a catalogue manner, information regarding numerous kinds of separations is readily available. Also, the material (chromatograms) is presented in graphic form which is easy to comprehend.

The book would be profitable to readers having little knowledge of liquid chromatography. It is simple and concise in regard to theory, technique, and instrumentation. Readers who do have experience might utilize the book as a guide when their use of liquid chromatography deviates into unfamiliar areas of application. Most of the chromatograms are referenced to original papers and authors. Readers of JAOCS probably would be most interested in this aspect.

The discussion of Equipment in Part One is a good concise review and updating of the major components and hardware used in liquid chromatographs. Actual users should be aware of this information.

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Organic Reactions, Vol. 22 W.G. Dauben, Editor in Chief (New York-Wiley and Sons, Inc., 1975, 474 pages, $24.95).

The value and excellence of Organic Reactions is well known to organic chemists, and usually a review of an annual volume needs little more than a listing of the chapter topics. However, with Volume 22 updating of earlier reviews has been initiated. Chapters on the Claisen and Cope rearrangements, Clemmensen reduction, and the Reformatsky Reaction fall into this category, but the Organocopper Reagents chapter reviews an aspect of this comparitively new field.

Volume 2 of Organic Reactions (1944) contains a chapter on the Claisen rearrangement which refers to the Cope Rearrangement as a similar reaction discovered recently. The present chapter in Volume 22 by Sara Jane Rhoads and N. Rebecca Raulins reviews the literature and correlates both reactions. The amount of work in these areas during the period 1942 to 1972 necessitates that this chapter be more than an updating. It is a comprehensive coverage of the field since the last review, comprising 250 pages and 439 references.

The chapter on "Substitution Reactions Using Organocopper Reagents" by Gary H. Posner is a natural extension of his review of these reagents in conjugate addition reactions in Volume 19. It follows the usual form of Organic Reactions and divides the discussion into reagents, substrates, and experimental sections. The chapter concludes as usual with a tabular summary of the compounds prepared via the method. It contains 320 references and comprises 150 pages of the text.

The chapter on "The Reformatsky Reaction" (37 pages) by Michael W. Rathke is an update of the reaction. The discussion of the Clemmensen Reduction by E. Vedejs, however, is short (21 pages), and confines itself to reactions in anhydrous solvents with zinc and dry hydrogen chloride. The conventional reductions with zinc and aqueous acid are referred to only for comparison.

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Seiyu roku (On Oil Manufacturing), written by Okura Nagatsune and illustrated by Matsukawa Hanzan. An English translation of the original 1836 Japanese Edition translanted by Erko Ariga and edited by Carter Litchfield with added commentaries by Richard C. Rudolph and Professor Litchfield (Olearius Editions, P.O. Box 525, New Brunswick, New Jersey 08903, 79 p., including 18 illustrations, 1974, $7.00).

A full review of this book was included in the August issue of JAOCS. However, the full address of the publisher is included here for ease of ordering.

Handbook of Moisture Determination and Control: Principles, Technique, Applications, A. Pande. (Marcel Dekker, Inc., 266 pages, 1974, $28.50).

The book is hard backed with an attractive pictorial cover. The printed matter is a photo reproduction of the typed manuscript with an extra half space between the lines and a reduction of ca. 30% in size. This results in a type face which is less bold than most printed material, and thus somewhat more difficult to read.

This is Volume 1 of a 4 volume monograph on the determination and control of moisture. Volume 1 contains 4 chapters. The first chapter includes a discussion of the properties of water, the way in which it may be bound to various materials, and how this affects measurement techniques. A discussion of statistical techniques and sampling techniques also is included. Chapter II discusses gravimetric methods and contains theory and descriptions of equipment and techniques. Distillation and chromatographic methods are presented in Chapter III. A description of the Karl Fischer technique (Chapter IV) includes various endpoint detection methods and also coulometric reagent generation. Each chapter contains many references with a total of 352 in this volume.

Volume 2 will describe other methods of measuring moisture, such as electrical and electronic, spectroscopic, and nuclear methods. A chapter on automatic control of moisture will be included. Volumes 3 and 4 will cover the measurement of moisture in various materials, such as textiles, wood, paper, foods, soils, sands, coal, chemicals, and biological materials.

Volume 1 gives a fairly broad survey of the work, techniques, and types of apparatus which have been used for each method of moisture determination. It would be useful reading for a person seeking a general idea of the development and some current uses of these techniques. At some points the text is not clear and easy to understand. Although some specific directions are given, this is not a laboratory manual and detailed instructions would need to be secured from the references, standard methods of analysis (AOCS, ASTM, etc.), or possibly Volumes 3 and 4 of the series.

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The Chemistry of Diacetylenes, M.F. Shostakovskii and A.V. Bogdanova, (Halsted Press, New York, NY, 1974. 493 pages, $45.00).

Diacetylene has intrinsic advantages over acetylene as a basic building block in chemical synthesis. Unfortunately, diacetylene's explosive nature and oxidative tendency to form highly unstable peroxides has discouraged its exploitation in the US. In the USSR, the availability of diacetylene as a low cost chemical has led to intensive investigation of its explosive properties and handling characteristics, and apparently has stimulated vigorous development of the compound's chemistry for potential application in the chemical industry. Therefore, it is fitting that Soviet chemists who have pioneered in the development of the subject should produce a comprehensive treatise of the chemistry of diacetylene, its homologs and derivatives. The present volume is a translation of the original Russian version published in 1971. The coverage in this monograph is assembled in 5 chapters.

The first chapter describes the preparation and properties of diacetylene and its homologs. The chapter incorporates an account of the explosive properties of diacetylene complete with directions and caveats on the storage, handling, and preparation of the compound in the gaseous and liquid states. The second chapter presents reactions of diacetylenes. The wide range of addition reactions by nucleophilic and electrophilic reagents and substitution reactions at the acetylene hydrogen are well characterized. Chapters 3 and 4 deal with the properties of functional derivatives of diacetylenes and ethynylvinyl compounds. The functional derivatives constitute a large group of natural polyynes which can be synthesized readily from diacetylene and its homologs. The ethynylvinyl derivatives are primary conversion products from diacetylene that have been included for their utility as starting materials in various syntheses because of high reactivity. The fifth chapter discusses some aspects of the practical application of synthetic compounds derived from diacetylene with emphasis on biological properties. The physical properties of diacetylene, vinyldiacetylene, enyne, diene and allenic compounds, and other compounds obtained from diacetylene are assembled in 6 tables as an appendix.

The Table of Contents is presented in adequate detail, but the omission of a subject index was disconcerting to this reviewer. Laborious thumbing of the pages for discrete information, for example, the macrocylic polyynes, cummulenes, and the acetylenic-allenic rearrangement required undue expenditure of time, if not frustration, to locate. Although macrocyclic polyynes and cummulenes are given only cursory treatment, the coverage of diacetylenes is thorough and comprehensive.

Lipid chemists will find much information in this volume to stimulate new ideas for their research. The antibiotic and herbicidal properties of diacetylene and polyacetylene derivatives suggest opportunities for the modification of fatty acids that may incorporate these properties. One consideration of economic importance for producers of natural fatty acids to contemplate is the potential application of diacetylene in the synthesis of aliphatic monocarboxylic and dicarboxylic acids.

The translation of this work into English is excellent and contains only minor errors. Whereas the price may not be viewed as excessive in this inflationary age, it may well discourage the volume's purchase by many chemists for their personal use. Institutional libraries, nevertheless, should acquire a copy as an invaluable addendum to their volumes on acetylenic chemistry.

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Bushuk and Ponte Elected to American Association of Cereal Chemists' Offices

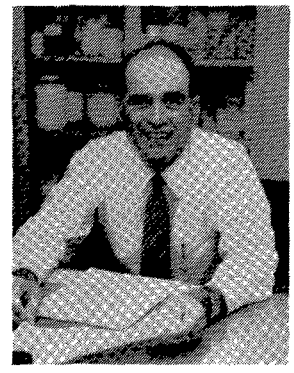
Walter Bushuk, Professor, Plant Science Department, University of Manitoba, Winnipeg, Canada, has been named President-Elect of the American Association of Cereal Chemists and Joseph G. Ponte, Jr., was named National AACC Secretary.

Bushuk received his BS degree in 1952 and his MS degree in plant biochemistry in 1953 from the University of Manitoba. He later earned his PhD degree in physical chemistry from McGill University before becoming an NRC of Canada, Post- doctorate Fellow, Strasbourg, France. Professionally, Bushuk has been a Research Chemist with the Grain Research Laboratory and Director of Research for Ogilvie Flour Mills Co. In 1964 he became Head, Wheat Research, Grain Research Laboratory. In addition to his AACC membership, Bushuk is a Fellow of the Chemical Institute of Canada and a member of the Canadian Institute of Food Science and Technology, and AOCS.

Joseph G. Ponte, Jr., the newly elected AACC National Secretary, is Manager, Research Services, Research Laboratories, ITT Continental Baking Company, Rye, NY. His current responsibilities are in the areas of cereal chemistry, analytical services, microbiology and the consumer kitchen and library for the laboratories.

Ponte obtained his BA degree in chemistry from Northwestern University. Graduate work done at the University of Minnesota later led to his MS degree in agricultural biochemistry. His working background includes commercial baking experience and several years spent in the laboratories of the American Institute of Baking. He has been with ITT Continental Baking since 1959. Besides his AACC affiliation, Ponte belongs to the American Chemical Society, AOCS, Institute of Food Technologists, and Sigma Xi. ■

Walter Bushuk



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